

What is claimed is:

1. A valve assembly comprising:

a movable valve element having a first face surface;

5 a valve seat having a second face surface for forming a face seal with said first face surface, wherein one of said first face surface and said second face surface includes a cavity sunk into said one face surface, said cavity having a peripheral bearing surface;

10 an o-ring inserted into said cavity and having an outer edge contacting said peripheral bearing surface; and

15 a retainer secured into said cavity internally of said o-ring, said retainer having a sloped peripheral edge squeezing said o-ring against said peripheral bearing surface, wherein said o-ring is deformed to substantially fill said cavity between said peripheral bearing surface and said sloped peripheral edge, and wherein a portion of said o-ring extends out of said cavity above said one face surface for forming a seal between said first and second face surfaces.

2. The valve assembly of claim 1 wherein said retainer has an unsloped peripheral edge portion adjacent to said sloped peripheral edge.

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3. The valve assembly of claim 1 wherein said cavity includes a chamfered edge adjacent to said peripheral bearing surface, some of said o-ring being deflected into a space adjacent said chamfered edge when said face surfaces are brought together for sealing.

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4. The valve assembly of claim 1 wherein said movable valve element comprises a piston.

5. The valve assembly of claim 1 wherein said movable valve element comprises a poppet.

6. The valve assembly of claim 1 wherein said cavity is sunk into said first  
5 face surface of said movable valve element.

7. The valve assembly of claim 6 wherein said movable valve element is comprised of a molded resin.

10 8. The valve assembly of claim 7 wherein said peripheral bearing surface is substantially perpendicular to said first face surface.

9. The valve assembly of claim 8 wherein said sloped peripheral edge of said retainer is inclined from said peripheral bearing surface at an angle of about 30°.

15 10. The valve assembly of claim 1 wherein said retainer is comprised of molded resin.

11. The valve assembly of claim 1 further comprising a valve stem  
20 extending coaxially with said movable valve element and said retainer, said movable valve element and said retainer being compressed together on said valve stem.

12. The valve assembly of claim 1 wherein said o-ring is toroidal, wherein said peripheral bearing surface is cylindrical, and wherein said retainer is disc-shaped.

25 13. The valve assembly of claim 1 wherein said o-ring is comprised of elastomeric material.

14. A valve assembly comprising:

a movable valve element having a first face surface with a cavity sunk therein, said cavity having a cylindrical peripheral bearing surface;

a valve seat having a second face surface for forming a face seal with said first face surface;

5 an o-ring inserted into said cavity and having an outer edge contacting said peripheral bearing surface; and

10 a disc-shaped retainer secured into said cavity internally of said o-ring, said disc-shaped retainer having a sloped peripheral edge squeezing said o-ring against said peripheral bearing surface, wherein said o-ring is deformed to substantially fill said cavity between said peripheral bearing surface and said sloped peripheral edge, and wherein a portion of said o-ring extends out of said cavity above said first face surface for forming a seal between said first and second face surfaces.

15. A method of providing a face seal in a valve assembly, comprising the steps of:

forming a movable valve element having a first face surface for sealing against a valve seat with a second face surface and having a cavity sunk therein, said cavity having a peripheral bearing surface;

20 inserting an o-ring into said cavity such that an outer edge of said o-ring is proximate to said peripheral bearing surface; and

25 inserting a retainer into said cavity internally of said o-ring so that a sloped peripheral edge of said retainer squeezes said o-ring against said peripheral bearing surface to deform said o-ring to substantially fill said cavity between said peripheral bearing surface and said peripheral edge and so that a portion of said o-ring extends out of said cavity above said first face surface for forming a seal between said first and second face surfaces.

16. The method of claim 15 further comprising the step of:

providing a valve stem coaxial with said movable valve element and said retainer; and

mounting at least one of said movable valve element and said retainer on said valve stem to compress said movable valve element and said retainer together.

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17. The method of claim 15 further comprising the step of:  
inserting said movable valve element with said o-ring and said retainer into a valve body so that said o-ring is selectively positionable against said valve seat.